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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/042,780	01/08/2002	Patrick Vandenamccle-Lepla	020798-002100US	5185
27820	7590	05/17/2006	EXAMINER	
WITHROW & TERRANOVA, P.L.L.C. P.O. BOX 1287 CARY, NC 27512			WONG, LINDA	
		ART UNIT		PAPER NUMBER
		2611		

DATE MAILED: 05/17/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/042,780	VANDENAMEELE-LEPLA, PATRICK	
	Examiner Linda Wong	Art Unit 2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on 27 February 2006.
- 2a) This action is **FINAL**. 2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 2-30 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) Claim(s) 2-3, 6, 28-30 is/are allowed.
- 6) Claim(s) 4, 7, 9-11, 13, 14, 16, 17 and 22-27 is/are rejected.
- 7) Claim(s) 5, 12, 15, 18-21 and 23 is/are objected to.
- 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on _____ is/are: a) accepted or b) objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) All b) Some * c) None of:
 1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) Notice of References Cited (PTO-892)
- 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) Notice of Informal Patent Application (PTO-152)
- 6) Other: _____.

DETAILED ACTION

Response to Arguments

1. Regarding **claims 4,7,26,28**, the objections as stated in the previous office action mailed 11/01/2005 are withdrawn due to the applicant's arguments and amendments.
2. Regarding **claims 2-3,6**, Applicant's arguments, see Applicant's Remarks, filed 2/27/2006, have been fully considered and are persuasive. The 35 USC 103 of claims 2-3,6 has been withdrawn.
3. Applicant's arguments regarding **claims 4,7,9-11,13-14,16,17,22-24,25-27** filed 2/27/2006 have been fully considered but they are not persuasive.
4. Regarding **claim 4**:
 - a. Limitation under discussion: The applicant argues refer to the limitation "associating each of a plurality of carriers of the multi-carrier data; assigning a value to each of the plurality of carrier-specific weighting factors, the value being related to a noise power associated with the associated carrier; ..."
 - b. Applicant's Arguments: The applicant argues Peeters discloses calculating the value of the weight based on the signal power of the plurality of carriers, but claim 4 recites assigning a value to the weights that is related to the signal power of the carrier, for example "inversely proportional to the noise power".
 - c. Examiner's Rebuttal with Regards to Peeters: The examiner respectfully disagrees with the arguments presented by the applicant regarding the prior art reference, Peeters. First, claim 4 does not recite the limitation of the value assigned to the carriers is inversely proportional to the noise power. In

contrast, the recited limitations states the value assigned to the plurality of carriers is related to the noise power, which indicates to the examiner that the value assigned to each of the plurality of carriers is calculated using the noise power of the carriers. As explained in the applicant's arguments (page 13, lines 28-31 and page 14, lines 1-4) and in Peeters' invention (Col. 7, lines 34-37), the value of the weights are calculated based on or related to the signal to noise ratio or noise power for the measured different pilot carriers, which indicates the value of the weights for the specific carriers is associated or based on the noise ratio or noise power as specified by the limitations disclosed above.

- d. Examiner's Rebuttal with Regards to Kumagai: The examiner respectfully disagrees with the arguments presented by the applicant regarding the prior art reference, Kumagai. In paragraph 32, Kumagai discloses determining the weights according to the "channel estimation result of each subcarrier provided by the channel estimator 6." In paragraph 22, Kumagai discloses calculating the channel estimates based on "the condition of a transmission channel which transmits the OFDM signals of a current packet, ..." "Both amplitude and phase of each subcarrier signal shall fluctuate because of frequency selective fading caused by multipath propagation." Based on the disclosed information, the examiner determines that the channel estimate determines the amount multipath propagation or noise found within the channel, which produces a channel estimation result of each subcarrier. Since the weights calculated for each subcarrier is based on the channel estimation result, then the weights are

based on the noise power, or noise or multipath propagation found in the channel calculated by the channel estimator. Thus, Kumagai discloses calculating or assigning the value of the weight for the plurality of carriers based on the noise power or noise.

- e. Conclusion: Based on the examiner's rebuttal of the deficiencies of references Kumagai and Peeters, the rejection for claim 4 stands as stated in the previous office action. Please refer to the rejection stated below.
- 5. Regarding **claims 7,17,25**,
 - a. Applicant's Arguments: On page 16, under heading Rejection Under 35 USC 103(a) – Kumagai, Peeters and Belotserkovsky, the applicant argues claims 7,17,25 has "similar language pertaining to the carrier-specific weighting factors." "Further, Belotserkovsky does not cure the deficiencies of Kumagai and Peeters."
 - b. Examiner's Rebuttal: As per the applicant's arguments, the examiner respectfully disagrees with the deficiencies of the references Peeters and Kumagai as stated in the arguments pertaining to the carrier-specific weighting factors in claim 4. Please refer to the rebuttal claim 4 for further clarity.
 - c. Examiner's Rebuttal with Regards to Belotserkovsky: Regarding the reference Belotserkovsky, based on the argument for this reference and the examiner's rebuttal of claim 4, the reference in combination with Kumagai and Peeters is valid.

- d. Conclusion: Based on the examiner's rebuttal, the rejection to claims 7,17,25 stands as stated in the previous office action. Please refer to the rejection stated below.
- 6. Regarding **claims 9-11,14,16,22,24, and 26-27**,
 - a. Applicant's Arguments: The applicant argues claims 9-11,14,16,19-20,22,24, and 26-27 are dependent "directly or indirectly to claims 4,7,17, and 25, are allowable" due to the deficiencies of Peeters, Kumagai and Belotserkovsky.
 - b. Examiner's Rebuttal: As per the explanation for claims 7,17, and 25, the examiner respectfully disagrees with the applicant in regards to the deficiencies of Peeters, Kumagai and Belotserkovsky. As states in the rebuttal for claims 7,17,25, please refer to the rebuttal for claims 4,7,17, and 25 for further explanation.
- 7. Regarding **claims 8,18-20**,
 - a. Applicant's Arguments: The applicant argues the motivation for the combination of Magee with Peeters and Kumagai.
 - b. Examiner's Response: The arguments regarding the motivation for the combination of Magee with Peeters and Kumagai are persuasive.
- 8. Regarding **claim 13**,
 - a. Applicant's Arguments: On page 17, under heading Rejection Under 35 USC 103(a) – Peeters, Kumagai, Belotserkovsky and IIR FAQ, the applicant argues "claim 13 depends indirectly from claim 7, which is argued above as allowable."

"Futher IIR FAQ does not cure the deficiencies of Kumagai, Peeters, and Belotserkovsky, since it merely pertains to the description of an IIR filter."

- b. Examiner's Rebuttal: As per the applicant's arguments, above, the examiner as included a rebuttal to the deficiencies of the references Peeters, Kumagai and Belotserkovsky in the rebuttal of claim 7. Please refer to the rebuttal for claim 7.
- c. Conclusion: Due to the rebuttal of claim 13, the examiner respectfully disagrees with the examiner, thus the rejection for claim 13 stands as rejected in the previous office action. Please refer to the rejection below.

9. Regarding **claims 28-30**, the examiner reviewed the references cited and the applicant's arguments have been fully considered and are persuasive. The 35 USC 103 of claims 28-30 has been withdrawn.

Note: Below are the rejections for the **claims 4,7,9-11,13-14,16,17,22-24,25-27** as stated in the office action mailed 11/1/2005.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. **Claims 4,7,9-11,14,16-17,22,24-27** are rejected under 35 U.S.C. 103(a) as being unpatentable over Kumagai et al (EP Patent No.: 1172956A1) in view of Peeters et al (US Patent No.: 6628738) and further in view of Belotserkovsky et al (US Patent No.: 6704374).

a. **Claim 4**, Kumagai et al discloses associating and assigning weights to pilot signals or carriers of the OFDM signal (page 6, paragraphs [0032]), calculating the carrier frequency offset by phase compensating the received signal (Fig. 14, labels 1302, and 1403), equalizing the phase compensated signal (Fig. 14, label 1401 and page 6, paragraphs [0032] and [0033] and page 20, paragraphs [0222] and [0223]), computing a phase metric (Fig. 14, output from label 1403) from the phase compensated signal (Fig. 14, label 1302), the equalized signal (Fig. 14, output from label 1401), and the plurality of carriers, which is contained in the equalized signal (Fig. 14, output from label 1401), computing a phase of the phase metric (Fig. 14, label 904). Although Kumagai et al fails to disclose assigning and associating the weights as specifically recited, Peeters et al. disclose a multi-carrier transmission system associating and assigning weighting factors with values (Fig. 1, label WEIGHT) to each of a plurality of carriers of a multi-carrier data (Fig. 1, labels MU'_0 – MU'_N-1), measuring the noise of the carriers ((Fig. 1, label SNR) and assigning the selected value to the associated carrier (Fig. 1, labels SNR and Weight). It would be obvious to one skilled the art to incorporate the teachings of Peeters et al to Kumagai et al's invention to provide more robustness of the synchronization for noise near a

pilot carrier. (Abstract, lines 10-12) Although Kumagai et al fail to disclose a loop filter, Belostserkovsky et al discloses an OFDM receiver comprising correcting the carrier frequency offset of the received signal by calculating the phase error or phase compensation and loop filtering the phase error. (Fig. 3, labels 74 and 76 and Abstract, lines 1-3) It would be obvious to one skilled in the art to incorporate a loop filter to Peeters et al and Kumagai et al's invention to eliminate unwanted portions of the phase error.

- b. **Claim 7** inherits all the limitations of claim 4, but claim 4 does not recite receiving the multi-carrier signal and estimating a clock frequency offset using the estimated carrier frequency offset. Kumagai et al discloses receiving the multi-carrier signal and calculating the clock frequency offset using a carrier frequency offset. (Fig. 14, labels 1403 and 904 and page 21, paragraph [0227])
- c. **Claims 9 and 10** inherit all the limitations of claim 3.
- d. **Claim 11** inherits all the limitations of claim 4.
- e. **Claim 14**, Kumagai et al discloses calculating a clock frequency offset using a factor inversely proportional to the carrier frequency offset. (pages 4-5, equation 5, paragraph [0018] and page 10, paragraph [0075])
- f. **Claim 16**, Kumagai et al discloses computing a first and second carrier frequency error. Although Kumagai et al does not explicitly state calculating a coarse and a fine carrier frequency offset, it is possible that the first and second carrier frequency errors calculated can be fine and coarse carrier frequency offsets. Kumagai et al updates the phase compensation factor using both the

first and second carrier frequency offset . (Fig. 12, labels 901, 1204, 904 and 109)

- g. **Claim 17** inherits all the limitations of claim 7, but claim 7 fails to recite the following limitations:
 - i. estimating a channel transfer function and
 - ii. each carrier specific weighting factors being associated with a different one of a plurality of carriers of the multi-carrier signal and assigned a value related to a noise power associated with the carrier.
- a. Regarding limitation i., Kumagai et al discloses estimating a channel transfer function. (Fig. 1, label 106)
- b. Regarding limitation ii, please refer to the rejection and rebuttal of claim 4.
- h. **Claim 22** inherits all the limitations of claim 14.
- i. **Claim 24** inherits all the limitations of claim 11.
- j. **Claim 25** inherits all the limitations of claim 17.
- k. **Claim 26**, Kumagai et al discloses a weight source (Fig. 6, label 601), a slicer or smoother, which smoothes out error found in a signal so to lessen or eliminate the noise (Fig. 6, label 602 and page 14, paragraph [0126]), a phase metric updater (Fig. 6, labels 603 and 502) to receive the lularity of channel estimates (Fig. 6, label 106), the phase compensated signal (Fig. 6, label 109), the sliced signal (Fig. 6, label 602), and the plurality of carrier-specific weights (Fig. 6, label 601), a phase computation unit coupled to the phase metric updater (Fig. 6, label 503). Although Kumagai et al does not disclose a loop

filter, Belostserkovsky et al discloses an OFDM receiver comprising correcting the carrier frequency offset of the received signal by calculating the phase error or phase compensation and loop filtering the phase error. (Fig. 3, labels 74 and 76 and Abstract, lines 1-3) It would be obvious to one skilled in the art to incorporate a loop filter to Peeters et al and Kumagai et al's invention to eliminate unwanted portions of the phase error.

- I. **Claim 27**, Kumgai discloses calculating the channel noise. (Fig. 6, label 106)
11. **Claim 13** is rejected under 35 U.S.C. 103(a) as being unpatentable over Peeters et al (US Patent No.: 6628738) in view of Kumagai et al (EP Patent No.: 1172956A1), further in view of Belotserkovsky et al (US Patent No.: 6704374) and further in view of Lowegian International (Publication: “dspGuru: Infinite Impulse Response Filter FAQ”).
 - a. **Claim 13**, Although Belotserkovsky et al does not explicitly state the type of filter, the loop filter can be an infinite impulse response (IIR) type filter. It would be obvious to one skilled in the art to use an IIR loop filter to “achieve a given filtering characteristic using less memory and calculations.” (Lowegian International)

Allowable Subject Matter

12. Claims 2-3,6,28-30 are allowed over prior art.

13. **Claims 5,12,15,18-21 and 23** are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Linda Wong whose telephone number is 571-272-6044. The examiner can normally be reached on 9-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chieh Fan can be reached on (571) 272-3042. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Linda Wong



DACHA
PRIMARY EXAMINER